No. 648.903. Patented May 1, 1900.

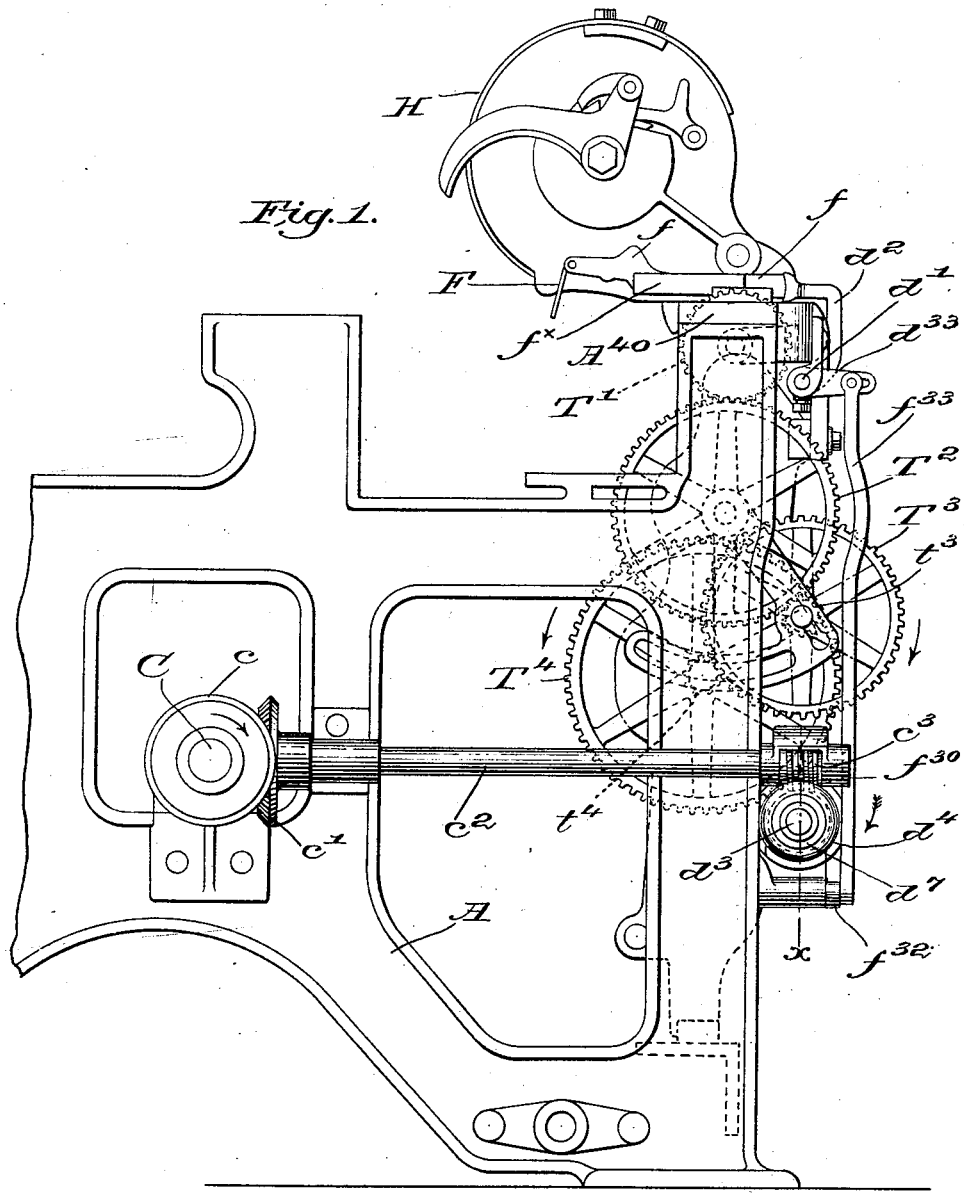
A. D. EMERY.

TAKE-UP MECHANISM FOR LOOMS.

(Application filed Dec. 13, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

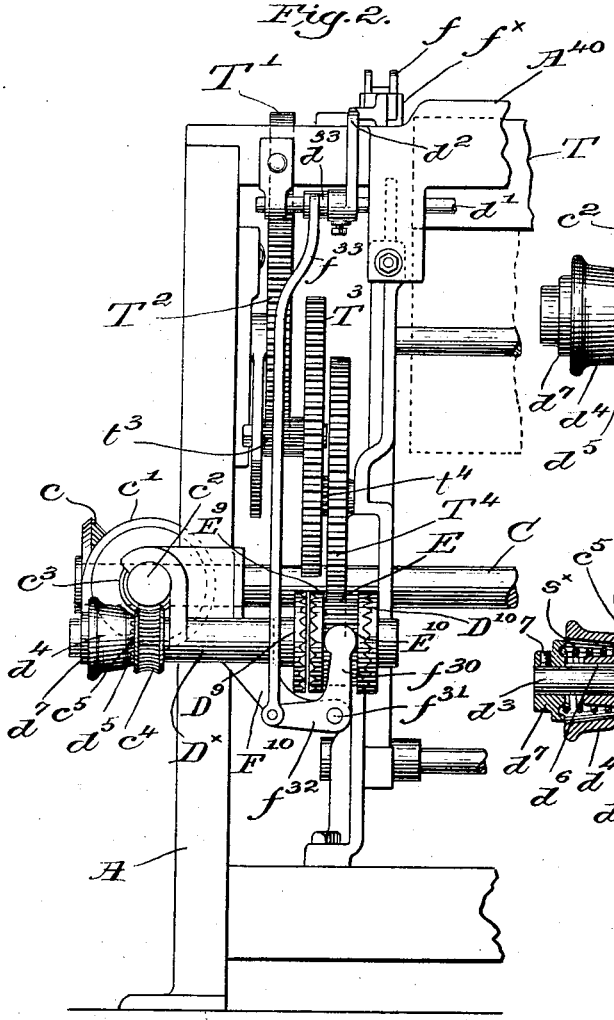


Fig. 3.

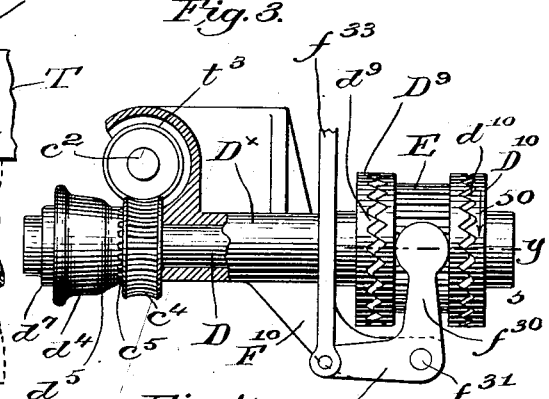
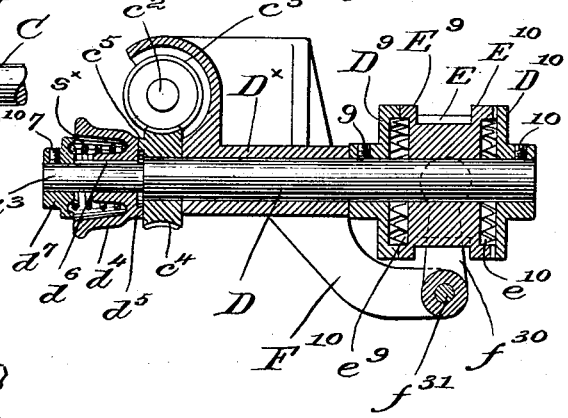


Fig. 4.



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UNITED STATES PATENT OFFICE.

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TAKE-UP MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 648,903, dated May 1, 1900.

Application filed December 13, 1899. Serial No. 740,151. (No model.)

To all whom it may concern:

Be it known that I, ABRAM D. EMERY, a citizen of the United States, residing at Taunton, county of Bristol, State of Massachusetts, have invented an Improvement in Take-Up Mechanism for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

This invention has for its object the production of novel take-up mechanism for looms, whereby the cloth roll will be positively and continuously wound, a positive let-back governed within predetermined limits being also embodied in and forming a part of the invention. The usual pawl-and-ratchet drive for take-up mechanism is in practice inefficient for performing such work, as obviously there is a little slip-back for each tooth, and the take-up of the cloth is not continuous, but is effected in a step-by-step or intermittent manner, due to the well-known action of pawl-and-ratchet mechanisms. In the present invention the driving member of the take-up mechanism is continuously rotated while the loom is in operation, and by the inclusion of a worm and worm-gear to effect the rotation of the driving member the latter, and consequently the take-up roll, will be held against the strain of the warp.

It is necessary in order to weave good cloth to retard or stop the take-up thereof during the slight interval occupied by change of filling in a loom provided with automatic filling-supplying mechanism—such, for instance, as forms the subject-matter of United States Patent No. 626,187, dated May 30, 1899—and also to prevent take-up when the loom is stopped automatically, and I have herein provided novel means for interrupting the action of the take-up at such time. It is also desirable to turn the take-up roll forward or back by hand sometimes, and provision has been made for permitting such operation.

Figure 1 is a left-hand side elevation of a portion of a loom provided with automatic filling-changing mechanism and with take-up mechanism embodying one form of my invention. Fig. 2 is a partial front elevation of the take-up mechanism. Fig. 3 is an enlarged detail in elevation of the driving and driven member of the take-up mechanism, and Fig. 4 is an enlarged longitudinal sectional view thereof on the line x, Fig. 1.

The loom-frame A, breast-beam A^{40}, cam-shaft C, filling-detector F, shown herein as a filling-fork and mounted on a slide f, movable in a guide $f^{\times}$, attached to the breast-beam, the automatic filling-changing mechanism, a part only of which is herein shown—viz., the hopper H, (see Fig. 1,)—and the controlling rock-shaft d' are and may be of usual construction in automatic looms, the controlling-shaft and filling-changing mechanism being substantially as in the patent hereinbefore referred to, the shaft having an upturned arm d^2 to be engaged by the slide f when the latter is moved outward, as it will be upon detecting movement of the detector F when the filling is absent, such movement of the arm d^2 rocking the shaft d' in well-known manner and effecting either a change of filling automatically without stopping the loom or changing the filling and at the same time stopping the loom, both operations being well known.

The take-up roll T (see Fig. 2) has fast to one of its journals a gear T', in mesh with a gear T^2, driven by a pinion t^3, rotatable with a large gear T^3, which in turn meshes with a pinion t^4, rotatable with a second large gear T^4, such train of gearing forming no novel part of my invention, the gear T^4 meshing with the driven member, to be described, of the take-up mechanism.

A bevel-gear c on the cam-shaft C of the loom is herein shown as in mesh with a like gear c', fast on a shaft c^2, mounted in suitable bearings on the loom-frame and extended toward the front of the loom and having fast upon it a worm c^3, in mesh with a worm-gear c^4, loosely mounted on a shaft D, rotatably mounted in a long bearing $D^{\times}$ on the front of the loom-frame. The shaft D is reduced at d^3 and has mounted upon it a recessed coupling member d^4, having at its inner end teeth or serrations d^5 to normally engage teeth or projections c^5 on the outer face of the worm-

gear, (see Fig. 2,) the said coupling member d^4 being splined, as at d^6, (see Fig. 4,) to the reduced portion of the shaft and normally held in operative position by a spring $s^\times$, the outer end of the latter abutting against a collar d^7, secured to the shaft by a set-screw 7.

It will be seen by reference to Fig. 4 that the spring-receiving recess in the coupling member d^4 is of greater diameter than the collar d^7, so that by grasping the coupling member the operator may move it to the left, viewing Fig. 4, to thereby disengage it from the worm-gear c^4, so that the shaft D can be rotated relatively to the said worm-gear. So long, however, as the worm-gear is coupled to the shaft it will be obvious that while the latter will be rotated by the worm it cannot have any retrograde movement, owing to the well-known locking action of a worm and meshing worm-gear against retrograde movement.

The shaft D has secured to it the driving member of the take-up mechanism, herein shown as two like disks D^9 D^{10}, secured to the shaft by suitable set-screws 9 10, (see Fig. 4,) the inner faces of the disks being separated and toothed, the series of teeth d^{10} on the disk D^{10}, which I will term the "follower-disk," being set behind the teeth d^9 on the opposed disk, as will be clear from an inspection of Fig. 3, it being noted that the broken line y passes through the point of one of the teeth d^{10} and midway between the points of two of the teeth of the other set d^9, so that the latter teeth are set ahead, as it were, a distance of one-half tooth over the follower-teeth. The driving member is continuously rotated so long as the loom is running, as will be manifest, with a steady even motion as compared with the step-by-step movement of a pawl-and-ratchet drive, and equally it will be manifest that there will be no backlash or give of the driving member, so that the device is particularly well adapted for weaving heavy goods, for the take-up roll is actuated through the train of gears described by said driving member through the mediation of a driven member now to be described.

I have herein shown the driven member as a pinion E, mounted loosely on the shaft D between the disks D^9 D^{10}, forming the driving member, and in mesh with the large gear T^4 of the train, said pinion having two annular flanges E^9 E^{10} thereon at its opposite ends and provided on their outer faces with teeth e^9 e^{10}, respectively, as clearly shown in Figs. 3 and 4. The extreme distance from the points of one set of teeth to the points of the other set is such that the pinion E may be shifted laterally to be brought into engagement with the teeth of one or the other of the disks D^9 D^{10} of the driving member. Normally the pinion is in the position shown in Fig. 2, so that the follower-disk D^{10} will actuate the take-up mechanism, a yoke f^{30}, fulcrumed at f^{31} on a stand F^{10}, entering the annular space between the flanges E^9 E^{10} and controlling the position of the pinion. An arm f^{32}, fast on or forming part of the yoke, is connected by a link f^{33} to an arm d^{33}, fast on the controlling or operating shaft d', (see Figs. 1 and 2,) and when said shaft is in normal position the pinion will be held in operative position, as shown in Fig. 2. When, however, said shaft is rocked, as it will be upon failure of the filling, detected by the filling-detector F in the present instance of my invention, the link f^{33} will be moved to throw the yoke to the left, Fig. 2, and the driven member E will be disengaged from the toothed follower-disk D^{10} and moved over into engagement with the other or leading disk D^9. Having reference more particularly to Fig. 3, the driven member is in mid-position and traveling to the left, the teeth d^{10} having moved forward in the direction of arrow 50 a distance equal to one-half a tooth; but the driven member has not partaken of such rotative movement at all, but has stopped during such movement of the driving member and will not be rotated while it is moved fully to the left entirely out of engagement with the disk D^{10}. Now the actuating-shaft d' is rocked into operative position to effect filling change and then back again into normal position, so that no sooner will the driven member E be moved fully to the left, Fig. 3, than it will be moved back again to the right into normal position; but as it lost an angular movement equal to one-half a tooth on the first shift it will also lose another space equal to a half-tooth on the second or return shift, or a space equal to one tooth in all. When, therefore, it is returned to normal position, the take-up mechanism will be again actuated, though said mechanism was stopped during the change of filling, as desired, in order that the formation of thin places in the cloth may be obviated.

Should the arrangement of the loom be such as to effect its stoppage upon detection of filling failure, the operation of the take-up mechanism will still be interrupted, as hereinbefore described, and resumed at the proper pick when the loom is again started.

Manifestly the difference between the teeth of the two disks of the driving member must be such that the loss in rotative movement of the driven member during the shifting thereof will interrupt the operation of the take-up mechanism long enough to prevent the formation of a thin place in the cloth being woven.

I have herein described one practical embodiment of my invention without attempting to show the various changes or modifications which may be made therein without departing from the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a loom provided with automatic fill-

ing-changing mechanism, a filling-detector, a controlling-shaft adapted to be operated by or through said detector upon detecting movement of the latter, take-up mechanism, including a continuously-rotating driving member, and a normally-coöperating driven member, and means actuated by operation of the controlling-shaft to effect relative movement of the driving and driven members during the operation of the said shaft, whereby take-up of the cloth is interrupted in the act of changing the filling.

2. In a loom provided with automatic filling-changing mechanism, a controlling-shaft adapted to be operated upon failure of the filling, take-up mechanism including normally coöperating rotatable driving and driven members, means actuated by operation of the controlling-shaft to effect relative rotation of the said members, to stop take-up of the cloth during the operation of the said shaft, and means to continuously rotate the driving member while the loom is running.

3. In a loom provided with automatic filling-changing mechanism, an operating-shaft, and take-up mechanism, including a continuously-rotating driving member, a normally-coöperating driven member, and means controlled by the actuation of the operating-shaft to throw the driven member out of operation during a change of filling and to thereafter return it to operative position, whereby take-up of the cloth is temporarily stopped.

4. In a loom, a filling-fork, a rock-shaft operated by or through the filling-fork upon failure of filling, and take-up mechanism, including a continuously-rotating driving member, and a normally-coöperating driven member, and means governed by the operation of the rock-shaft to throw the driven member out of action during the operation of the rock-shaft, and to thereafter throw the driven member into action.

5. In a loom, take-up mechanism, including a positively and continuously rotating driving member, a locking device to prevent retrograde movement thereof at all times, and a driven member normally coöperating with the driving member, combined with a filling-detector, and means controlled by detecting movement thereof to prevent coöperation of the driving and driven members during the operation of the filling-detector.

6. In a loom, take-up mechanism, including a driving member having two opposed and connected disks toothed on their inner faces, the teeth of one disk being set ahead of the teeth on the other, and a toothed driven member laterally movable between said disks and normally in engagement with one of them, combined with a filling-detector, and means operated by its detecting movement to move the driven member out of engagement with one disk and into engagement with the other, whereby the driving member will gain upon the driven member and take-up of the cloth will be stopped at such time.

7. In a loom, take-up mechanism, including two connected and continuously-rotated driving-disks toothed on their inner faces, the teeth on one being set ahead of the teeth on the other disk, and a toothed driven member normally in engagement with the follower-disk, combined with a filling-detector, and means operated by detecting movement of the detector to shift the driven member into engagement with the leading disk, and back into normal position, whereby take-up will be interrupted in accordance with the difference in the set of the teeth on the driving-disks.

8. In a loom, a take-up roll, means to rotate the same positively and continuously, said means including a worm driven by a continuously-rotating part of the loom, a meshing worm-gear having a connected driving member, and a normally-coöperating driven member, the worm and gear locking the take-up from retrogression, combined with a filling-detector, and means operative upon detecting movement thereof to effect rotative movement of the driving member relative to the said driven member, during the operation of the filling-detector, whereby take-up of the cloth is interrupted during such relative movement.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ABRAM D. EMERY.

Witnesses:
GEORGE OTIS DRAPER,
ERNEST W. WOOD.